

## ABSTRACT

A process and apparatus for catalytic production of single walled carbon nanotubes. Catalytic particles are exposed to different process conditions at successive stages wherein the catalytic particles do not come in contact with reactive (catalytic) gases until preferred process conditions have been attained, thereby controlling the quantity and form of carbon nanotubes produced. The reaction gas is preferably provided at a high space velocity to minimize CO<sub>2</sub> build-up. The process also contemplates processes and apparatus which recycle and reuse the gases and catalytic particulate materials, thereby maximizing cost efficiency, reducing wastes, reducing the need for additional raw materials, and producing the carbon nanotubes, especially SWNTs, in greater quantities and for lower costs.